

The Chemical Age

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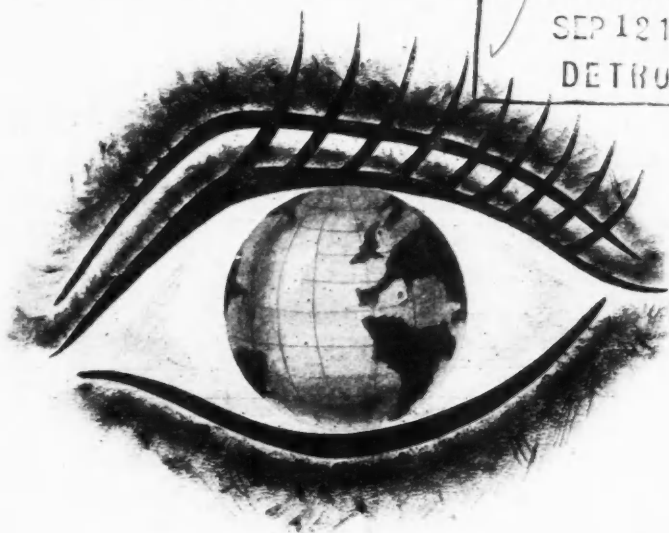
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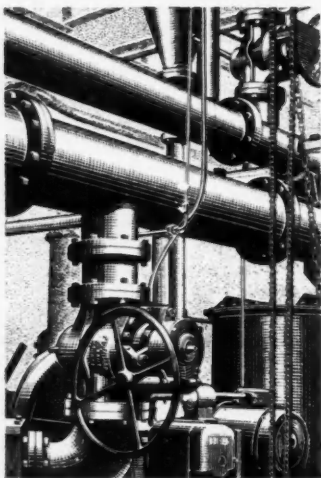
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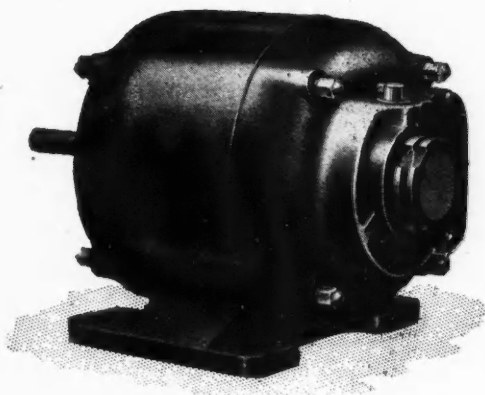


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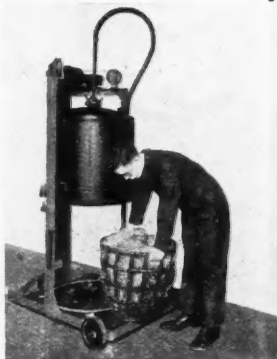
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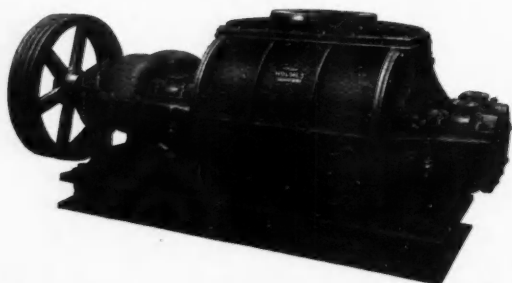
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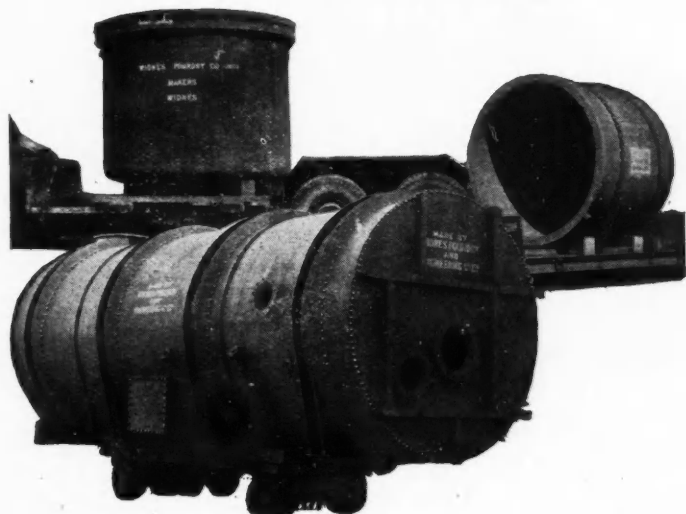


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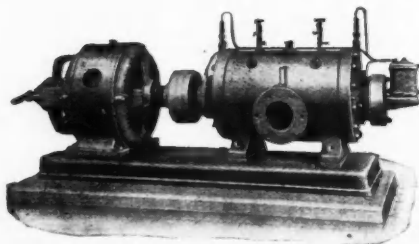
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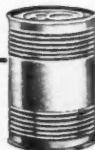
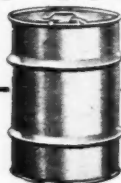
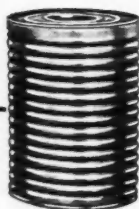
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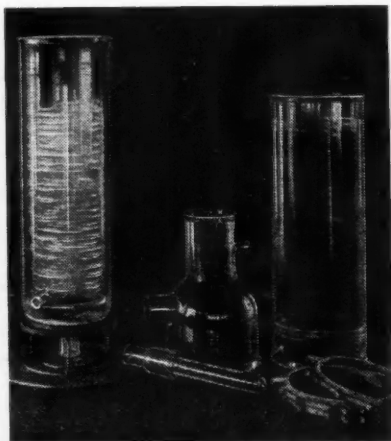
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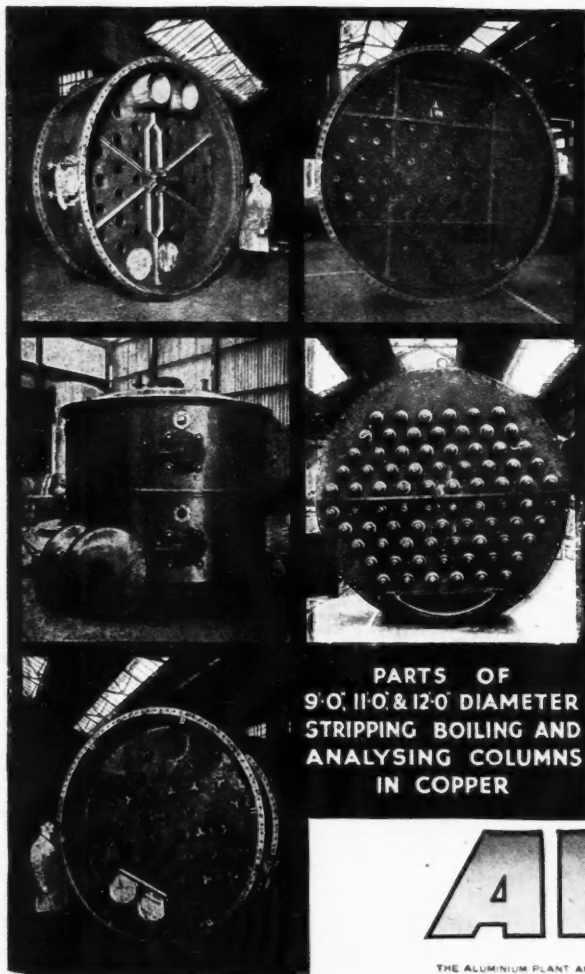
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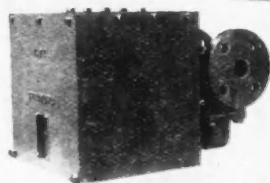
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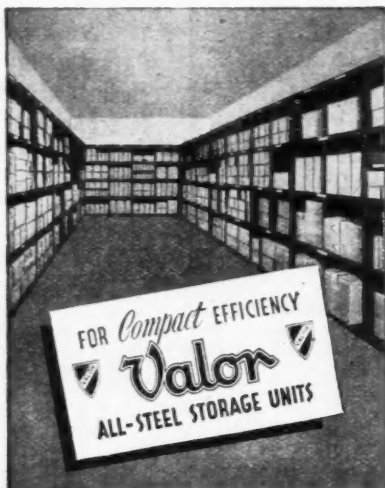
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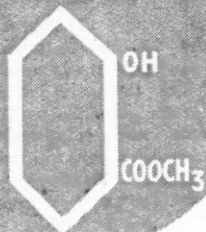
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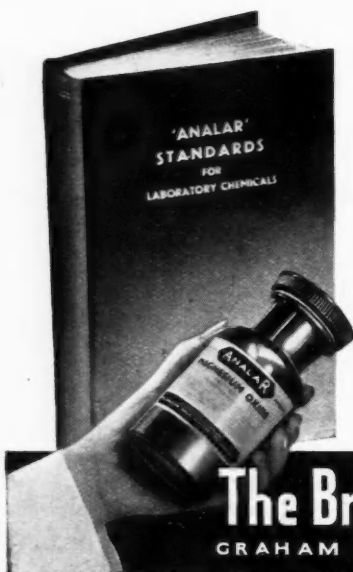
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Selection and Management

FEW human beings know what is good for them, and still fewer know what they are good for. Few of us, like the bishop with whom Jack Point jested, are good for nothing, but just what we are good for, and in particular what we are best at, is painfully discovered by trial and error (often assisted periodically by the order of the boot) during our journey through this terrestrial vale of tears. Given a heterogeneous assortment of individuals, some well-adjusted, some ill-adjusted, some doing their ideal work, others quite the reverse, there will clearly arise much, in the complex relations between the individuals thus thrown together, that must puzzle any management. Management's job in its relations with employees is to keep all working in harmony as a team within the economic limits imposed by the necessity for profitable trading. The success of many smaller, and in particular of older, businesses lay in the personal contact between the head of the firm and his men. We had the experience recently of being shown round such a works by the managing director. We lost count of the number of times he stopped to ask after some son or daughter, to in-

quire how some personal problem or difficulty was getting on, to answer personal questions or to give a word of personal advice or encouragement. It was a very happy work.

Some of these problems were discussed in an interesting paper on the future of psychology in industry, by Mr. G. K. B. Evens. (*J. Inst. Ind. Admin.*, Feb., 1945). The selection of the employee for his job is regarded as an essential feature of our post-war administration. Full employment for all is not sufficient; so far as possible we must also put everyone into a job for which he is suited, and to do that the trial-and-error method must be replaced by something better and quicker. Mr. Evens points out that this test has been applied on a large scale; most of the men and women

in our own Services have by this time undergone at least an intelligence test, and possibly tests of mechanical aptitude or manual dexterity as well. They know that there is nothing very alarming in the experience, and, in fact, their general attitude is probably adequately summed up in the following extract from a recent official publication: "Many a man must have wondered why he could not have had, just for his own

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satisfaction, a similar test in peace time. Have there to be square pegs in square holes only in war time?" American business men have not been slow to realise the possibilities of this new science, and psychologists are employed in all the main industries. We may reasonably expect similar developments here after the war. If we are to abide by our programme of employment for all, the correct placing of every worker must be a primary aim.

The problem is not solved by a few simple tests, however. Tests of general aptitude must be followed by specific aptitude tests which can be properly applied within each individual firm only after a proper job analysis has been undertaken by a trained psychologist. Mr. Evens asks that the general aptitude tests shall be conducted at employment exchanges as part of the normal routine, and that the results of these tests, together with the usual employment interview, should be entered up and made available to the factory psychologist to prevent unnecessary duplication.

The question immediately arises whether the science of psychology is sufficiently sure of itself to undertake this nation-wide task of regimentation. Is it regimentation? It is not called so, but it would be so in practice, because if this routine were to become established, employment exchanges would not send a man after a job for which his psychological tests indicated that he was unfit. A budding chemist or chemical engineer might be for ever condemned to be a navvy, and if the psychological test—or the tester!—had been in error, the climb to something better would be more difficult than it is to-day. Mr. Evens appears to harbour no doubts on this score, but a very careful "check-up" will be necessary before such a weapon is added to the armoury of officialdom in its dealings with the individual. There is far less danger in the application of psychology by firms, for the findings of one psychologist will not be binding for evermore, since each firm will apply its own tests; moreover, firms are quite human in their relations with their employees and will apply commonsense as well as psychology, when the findings of the two do not happen to coincide.

Psychology appears to be of considerable value in assessing a person's capabilities for higher posts. Training of foremen and supervisors by means of lectures, conferences, and discussions is being undertaken by a number of firms. The Institute of Industrial Administration is itself giving a lead in its insistence on sound training for management. Much has been said in this connection concerning the need for picking the right man in the first place. All the lectures and discussions in the world will not create good supervisors unless the material is there to work on. But, so far, the help that psychological methods can give in selecting such men has been almost entirely ignored. Psychological tests, it seems to have been assumed, are all right for manual and clerical workers, but for future managers—no! And yet, says Mr. Evens, if there is one thing that distinguishes managers as a class from those who work under them, it is that they possess a distinctly higher degree of intelligence. Those under them not infrequently dispute this generalisation. But superior alertness and mental adaptability appears to reveal itself in the intelligence-test scores of managers as a group, and is one quality which can be measured with certainty. Tests of personality and temperament have as yet been applied with only limited success for industry generally, but can be very useful for selecting supervisors.

The interrelations of those who are thrown together in their daily work is important. Industry is not run by production systems, or paper work, or rules and regulations: it is run by daily contacts of the human beings who operate the systems and the paper work. How these individuals react to each other, either in face-to-face situations, or on the telephone, or through memoranda requires analysis in detail. Mr. Evens quotes as a useful discovery, the finding that persons seated opposite to each other are more likely to disagree than those seated side by side. He suggests that attention to seating at committee meetings would save a deal of squabbling. We live in an age of committees and this discovery should have been made much earlier! Our view is that propinquity may moderate the violence of disagreement, particularly

when one's neighbour is a large man, but does not affect the fact of disagreement when anything worth disagreeing about is under discussion.

The teachings of psychology on employee-interviewing, and on the work of the personal relations officers are highly important. The well-known experiment at the Hawthorne works in America is cited by Mr. Evens. Instead of seeking information on matters of fact, the interviewers found it profitable to allow the employee to choose his own topics for discussion. In this way, purely personal problems and preoccupations which lay at the root of much dissatisfaction were first brought to the notice of the supervisors. More important, however, was the "cathartic" or releasing effect of these undirected interviews on the minds of the employees concerned, most of whom felt that the free expression of their thoughts and feelings had done them a great deal of good, besides improving their relations with the company. A recent study of the incidence of nervous conditions among factory workers in this country reveals the magnitude of the problem as it exists at present. Out of a random sample of over 400 individuals in three different factories, the proportion found to be suffering from anxieties, worries, or mental disorders sufficiently serious

to affect their general health and efficiency was, at a conservative estimate, 25 per cent. The majority of these cases, it was judged by the interviewers, would benefit greatly from the introduction of a Personal Problems Service; such a scheme would contribute materially to the reduction of absenteeism and labour turnover.

Mr. Evens is an enthusiast, and in his view only a fraction of the research findings of the past 25 years have so far been applied in industry, "in spite of the potential savings in time, money and human energy they represent." We are a long way behind the best American practice. We ourselves have little doubt that a new technique in industrial employee selection and management has been evolved. What remains now is to put it to extended trial. There are important firms in this country that pay considerable attention to the findings of psychologists and base their employee-selection on these tests. What is required is for more experiments in this direction until the assurance of its value comes, not from the practitioners in the art, but from employers and their employees. Practitioners are apt to be enthusiasts; those on whom they practise are apt to be sceptics. "By scepticism," said old Cicero, "we come at the truth."

NOTES AND COMMENTS

Exit Lend-Lease

THE abrupt termination of lend-lease marks the end of the war-time system of international trade. The generous help given by the United States since March, 1941, will never be forgotten. Instituted by the late President Roosevelt at a time when this country's survival was in the balance, and after Britain had disinvested herself of valuable foreign assets, lend-lease had been a major weapon of war, which contributed greatly to the United Nations' victory. During the four years to the end of March, Great Britain, Russia, France, China and the other Allies had received, without payment, supplies worth 39,000,000,000 dollars. The United States Administration, true to its pledge given to Congress, had repeatedly made it plain that

lend-lease must end with the fighting. Indeed, nobody in this country expected the United States to prolong lend-lease indefinitely. However, after so many idealistic speeches had been made on both sides of the Atlantic, stressing the need for a continued and close Anglo-American co-operation after the war, the immediate cessation of lend-lease without previous consultation and discussion has created a psychological shock which will linger on for years to come, regardless whether the Halifax-Keynes mission will return home with palliatives or not. It has been alleged that the cessation of lend-lease was a blow aimed at the new British Government. However, a more correct interpretation of this step is to be found in the domestic situation obtaining across the Atlantic. The end of lend-lease is

part and parcel of the American domestic reconversion programme with its sudden end to all war-time methods and controls, regardless whether good or bad. According to official estimates, 8,000,000 unemployed may be expected in the United States by Christmas. This fact, and the retreat of the U.S. from international trade, which might lead to her retreat from world affairs, are the most serious characteristics of the new situation.

Britain's Position

AS far as Britain is concerned, the position is at present serious enough. In 1943, this country received, according to recently published import statistics, goods worth £535,160,000 and £532,600,000 in 1943 and 1944 respectively, as compared with £118,000,000 in 1938. Imports of chemicals aggregated £13,000,000 last year, compared with £16,300,000 in 1943 and £2,800,000 in 1938. Owing to the importance of oil in total war, imports of oils, fats and resins rose from a mere £11,600,000 in 1938 to no less than £195,200,000 last year. Britain's dependence on imported food, especially protein food, is too well known to require further comment. Although the terms of the U.S. 30-year loan offer are favourable as compared with pre-war standards, there is a strong reluctance in this country to enter into commitments without knowing anything definite about the future system of world trade. Britain cannot afford to accept a loan and to pile up a dollar war debt unless her capital position is first put in order. Default is too grave a risk for a nation with a large stake in international trade. After a period of continued war-time austerity, new sources of supplies will become available at home, in the Empire and in the Colonies, as well as in Foreign countries. There is, therefore, no need to exaggerate the effects of the sudden end of lend-lease; but there is no doubt that hard work will be needed to put Britain on her feet.

Colonial Research

ONLY by a few days did the publication *Colonial Research, 1944-45* (H.M.S.O.; 6d.), miss the fiftieth anniversary of Mosquito Day—August 20—the day on which Ross and Manson discovered that malaria was due to a special

kind of mosquito. This would have been an appropriate date for publication as it is announced that the princely sum of £4500 has been provided for Colonial applications of DDT, preliminary accounts of which (from British Guiana trials) indicate that this insecticide will be an important addition to the armament of the malarialogist. The publication, by the way, combines the second annual report of the Colonial Research Committee with that of the Colonial Products Research Council and the first annual report of the Colonial Social Science Research Council. Many points in the report of the Colonial Products Research Council are of the highest interest to the chemical industry, and these are detailed elsewhere in our columns. One important general principle has resulted from the Caribbean tour of Professor J. L. Simonsen, the Director of Research, and that is the appointment of Correspondents in all the Caribbean Colonies, who shall be in direct relations with the Director; and a list of their names and addresses is included. Sir Robert Robinson, who accompanied the Director, suggested that a Research Organisation for Sugar Technology should be established on the lines of the Divisions of the D.S.I.R., and though at present it is felt that the necessary expenditure cannot be afforded, the Directors of the Colonial Products Research Council hope that some development in this direction will soon be possible.

U.S. Tin Controls

Need for Malayan Supplies

TIN controls must be continued until a sufficient supply is obtained from the Malaya and adjacent territories, the world's principal tin source. W.P.B. officials informed the Tin Plate Industry Advisory Committee. The tin-lead-zinc division had already requested the military authorities to furnish all available information about the condition of the tin mines in the Far East, as well as on available pig tin stocks.

Although the recently announced reduction of the naval shipbuilding programme may reduce bronze requirements, which in turn will lower the demand for tin for new construction, much bronze will still be needed. Concern has been expressed at the increased tin consumption this year, which amounted to 47,000 long tons in the first six months, compared with 90,000 long tons in the whole of 1944.

Colonial Chemistry

An Important Research Review

A REVIEW of the research work in progress on behalf of the Colonial Products Research Council is among the most interesting parts of the recently published booklet—*Colonial Research, 1944-45* (H.M.S.O.; 6d.)—embodying the report presented by the Secretary for the Colonies to Parliament last month. Some general account of the booklet is included in our editorial comments on an earlier page.

Points of particular interest to the chemical industry include the decision to establish a new Microbiological Research Laboratory in Trinidad. The site of this will shortly be fixed by Dr. A. C. Thaysen, of the Chemical Research Laboratory, Teddington, whose research work led to the establishment of the Food Yeast Factory in Jamaica. Dr. Thaysen will direct the research at the new station. Further work on yeast, grown under tropical conditions, as a source of ergosterol, will be undertaken by Dr. Walls at Teddington.

Lime oil from Trinidad is the subject of studies by a group at the Imperial College, South Kensington. Four crystalline compounds have now been identified in the expressed oil: limettin, isopinpinellin, bergaptol, and 5-geranoxyl-7-methoxy coumarin, the last being present to the extent of 2-2½ per cent. Investigation of the liquid constituents is now in progress. At King's College, Newcastle-on-Tyne, work on the reactions of eugenol (clove oil) has been pursued. Some of the derivatives are being examined for chemotherapeutic properties. Since it has also appeared possible that eugenol derivatives might find application in the dyestuffs industry, a new investigation has begun at Leeds University. Results so far obtained suggest that prolonged study will be necessary to find new commercial applications for eugenol.

Sucrose and Starch

Work on the utilisation of sucrose has been carried on by Professor W. N. Haworth and Dr. L. F. Wiggins, who have directed their attention both to possible applications of sugar derivatives either as chemotherapeutic agents or in the plastics industry. Of special interest is the observation that evaporated crude cane juice can be used in place of sucrose for the preparation of break-down products. Several industrial undertakings have shown an interest in sucrose products. A team working also under Professor Haworth and Dr. S. Peat has started research in the field of starch chemistry, and a grant has been made to enable Mr. H. P. Watson, of Nairobi, to make a preliminary survey of

East African starches. The commercial possibilities of cocoa meal as a cattle food are being examined, it having been shown at the Government Laboratory that the theobromine content could be reduced to 0.1 per cent. by solvent extraction after treatment with ammonia. The study of Colonial vegetable oils generally has been continued at Liverpool University, under Professor Hilditch.

Contacts with Industry

Generally, the Council regard it as part of their function to encourage and assist colonial producers, who are in a position to do so, to embark upon schemes of research regarding their produce, and they are gratified that in the following two instances their advice has been so readily taken.

(a) Important results have accrued from the research work financed by the Sisal Growers' Association which is being carried out under Professor J. B. Speakman, of the University of Leeds. This work was set on foot as a result of introductions given by the Director of Research and while the Council has no responsibility for this work, it has followed it with much interest in view of the great importance of this industry to East Africa.

(b) Financial provision has been made by the Kenya Pyrethrum Board to support research by Professor J. W. Munro, at the Imperial College of Science and Technology on this insecticide. This new research has resulted from a visit paid to this country by Commander E. J. Couldrey, chairman of the board, when a meeting was arranged between him and Professor Munro and a programme of research prepared.

Cinchona bark, containing the highest alkaloidal content from other than East Indian material, is now being grown in a farm situated in the eastern slopes of the Peruvian Andes, about 30 kilometres from La Merced. The first plantings were made by a colony of Japanese in 1931 with seeds smuggled out of Java and the plantation was confiscated by the Peruvian Government in 1942.

The publication of a new periodical, *The Journal of Colloid Science*, to cover that field from both the pure and applied points of view, is announced by The Academic Press of New York. The editorial board includes several internationally known colloid scientists. Manuscripts may be sent to the editorial office, 125 East 23rd Street, New York, 10, N.Y.

The Realisation of the Atomic Bomb

Contribution by British Industry

THE Treasury has now published, under the title "Statements Relating to the Atomic Bomb," the full text of the statement issued by the Directorate of Tube Alloys of the D.S.I.R. (H.M.S.O., 4d.). In addition, it includes the statements made in the House by the Prime Minister and Mr. Churchill.

On 23 pages, the brochure contains an interesting historical survey and a description of the British work on the realisation of the atomic bomb. In these columns it is not possible to give more than brief extracts from the statement, the full text of which will undoubtedly find a large number of readers.

British Tube Alloys Programme

As regards the British Tube Alloys programme, it was clear in 1942 that the scale upon which research and development could be undertaken in the United Kingdom must be far smaller than in America, as the industrial resources of Britain were engaged, at that time, in war production to a much greater extent than was the case in the United States. Consequently, it was necessary to limit the field of investigation to the following subjects: determination of essential nuclear physical data; theoretical investigations into the chain reaction in an atomic bomb, its dimensions, design, and blast effect; the gaseous diffusion U.235 separation process; the manufacture of uranium metal, and investigations into, and the manufacture of "heavy water."

The experimental work on the gaseous diffusion process was under the general direction of Dr. Simon, at the Clarendon Laboratory. The theoretical study of the process remained in the hands of Professor Peierls and his group at Birmingham. Also at Birmingham University, Professor Haworth, who had been very active in Tube Alloys, had a group working on a number of chemical problems connected with the diffusion process.

The Metropolitan-Vickers Electrical Co., Ltd., accepted a contract for the design and construction of certain prototype machines embodying the principles worked out by Dr. Simon and Professor Peierls. The successful construction of these machines was a considerable technical achievement in view of the novel features contained in them. They were later abandoned in favour of a simpler design which offered certain advantages in operation.

Imperial Chemical Industries, Ltd., were entrusted with the contract for the development of the diffusion plant as a whole, and the work was carried out by the Bil-

lingham Division of that company. This programme was a very extensive one as it covered everything involved in the design of a complete plant, including the working out of flow-sheets, research on materials of construction and the development of new type of valves, instruments, etc.

In this work they were assisted by the Metals Division of I.C.I., which studied various manufacturing processes. I.C.I. Metals, Ltd., had, as sub-contractors, Percy Lund Humphries & Co., Ltd., and the Sun Engraving Co., Ltd., co-ordinated by Dr. Banks, whose services were made available by the Printing and Allied Trades Research Association. Metallisation, Ltd., also made a valuable contribution to this section of the work. Processes for the manufacture of the many special chemicals required were worked out by the general chemicals division of I.C.I., assisted by the dyestuffs division. The Mound Nickel Co., Ltd., under a separate contract, made a very successful investigation of certain metallurgical problems.

Although some of these research programmes will be carried on a little longer, largely in order to establish optimum conditions, I.C.I. Billingham division has been able to close down the main programme after producing flow-sheets and designs for diffusion plants operating over a fairly wide range of conditions. The plant is similar to the American diffusion plant now in operation, but it embodies certain novel features.

Manufacture of Uranium Metal

I.C.I. (General Chemicals), Ltd., undertook the manufacture of uranium metal and succeeded in developing a satisfactory method. The conversion of the metal into rods, as required for the slow neutron system, or "piles," was tackled by I.C.I. Metals Division. It soon became apparent that many problems required study in connection with the physical, metallurgical, and chemical properties of the metal. Research on these points was undertaken by the National Physical Laboratory, Dr. Simon at Oxford with a sub-group at Birmingham, the British Non-Ferrous Metals Research Association, Dr. Orowan at Cambridge and the Alkali Division of I.C.I.

Heavy Water

As the I.C.I. Billingham division had some experience in the separation of "heavy water" on a laboratory scale, it was asked to prepare a scheme for the production of this material on a large scale. Eventually the electrolytic process introduced by Professor Taylor, of Princeton University, was adopted.

Metallurgical Section

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Metallurgical Section

September 1, 1945

The Technique of Macrography

I—Preparation of Specimen by Macro-etching

MACROGRAPHY is a method of metallurgical inquiry in which the entire mass of the metal, rather than extremely small section of it is regarded as the basis. The structure of a specimen as revealed by macrography is termed the macrostructure, and the desired picture is obtained in the form of a macrograph. This is mainly intended to show the structure of an ingot or other large piece of metal, and is specially valuable because it shows the lines of "flow" of the material in portions forged, rolled, used, machined, or mechanically or manually worked in various ways. Moreover it may also reveal the way in which different impurities are distributed. Local impurities or segregations are clearly shown, and a check can thus be kept on the routine or special analysis of the metal itself. It often happens that chemical analysis suggests soundness when the macrophotograph reveals precisely the opposite.

Unfortunately, the enormous advance made in recent years in microphotography and microstructural examination has obscured to some extent the value and importance of macrography, which may be regarded as the bridge between the ordinary less-than-natural-size photograph and the microphotograph obtained by high-power microscope work, but it is by no means easy to distinguish among the three branches of metallurgical inquiry. The boundary line is hard to fix, for macrography includes a certain amount of low-power magnification, but in this article, which is intended to outline the methods and apparatus employed, the assumption will be that macrography ceases to be macrography when it employs a magnification greater than $\times 30$, and when the magnification is less than $\times \frac{1}{2}$. In the former instance it becomes microphotography; in the latter, ordinary photography.

Advantage of Macrography

A special advantage of macrography is that it enables a comparatively large surface of the part investigated to be examined as a preliminary to the high-power magnifications of micrography, and it may reveal such structural conditions as a variation in the grain size, a difference in the form of the grains, lack of homogeneity, the presence of cracks, surface flaws, strains, and local areas

of work-hardening. It is not the writer's purpose to embark upon a study of macrographic interpretation which must be considered separately. Here, the chief concern is technique, which comprises: (a) the preparation of the specimen by macro-etching; (b) the methods and apparatus employed; (c) the photographic methods used. The examples given are mostly based on work in connection with steel, and as the writer has worked for over 30 years in one of the largest steel works of the country, his choice will be understood.

It would be wrong to suggest that finality has been reached in regard to macro-etching. It remains true that the success achieved is still to a considerable degree dependent on the skill and experience of the individual investigator, and it cannot be said that the methods have been fully standardised. There is little doubt, however, that when the value of macrography becomes once more perceptible to metallurgists, at present more interested in high-power microscopy and micro-photography, the development of standard techniques will follow.

Choice of Etching Medium

The first important point is choice of an etching medium. Taking steel first, to-day it is widely, though not unanimously, regarded as advantageous for a hot mineral acid to be employed. These acids are easy to use and give excellent results in the great majority of instances. Of these acids, the best appears to be hydrochloric acid, which is easy to apply, quick and cheap, and produces a clear structural picture. A suitable formula is $\text{HCl } 50 + \text{H}_2\text{O } 50$ by volume, giving a composition of constant boiling point. It is used hot, and the test-pieces are maintained in the solution for a sufficiently long period, taken out, rinsed and scrubbed, and then dried.

This solution is particularly good in enabling the segregation of impurities or major constituents resulting from progressive solidification to be perceived, but such a result is possible only because the solution is highly selective in this respect. For this very reason it is vital that the period of etching and the temperature of the solution shall be rigidly controlled, and the solution itself with the technique and conditions

standardised as far as possible. Otherwise there is a danger that the test-piece may be left too long in the solution or the solution used too hot, which creates a spongy, pitted surface, giving an erroneous picture of segregation in the centre. Research appears to have established that the most satisfactory etching period depends on the type of heat treatment given to the steel, but the ordinary working range for plain bars is from $\frac{1}{2}$ to 1 hour, the longer periods corresponding to steels with increased carbon or alloying element percentages. The best temperature appears to be 70°C.

The sponginess developed by excessive etching may easily lead the operator to believe the steel defective, while the actual faults may pass unnoticed. In considering the range of immersion times given above, the reader should bear in mind that longer or shorter periods may be required for special work. Hardened tool steel, for example, examined for cracks, requires only a few minutes in the solution, and to immerse for longer is superfluous.

The specimens for macrographic examination have to be polished superficially just as for micrography, but this preliminary work will be less exacting because it is rarely possible to deal with a large mass as thoroughly and meticulously as with a small microsection. The method of surface preparation adopted will be mainly governed by circumstances. The metal surface of bar stock, for example, may be simply planed or sawn for ordinary shop inspection; but for research work or more stringent examination, the specimen must be mechanically ground or hand-filed. No local heating during planing, sawing, grinding or polishing should be allowed. Polishing down to a No. 320 wet paper is frequently advisable. All dirt, oil, etc., must be removed and it is better to warm the specimen before immersing it in the bath. This may be done by plunging it into hot water or heating it on a hot plate. Cotton-wool steeped in alcohol rubbed over the ground or filed surface will remove all grease, oil, etc.

Final Operations

For normal macrographic etching, the solution can be held in flat heat-resisting glass vessels or porcelain dishes. In the latter instance, the heating up is preferably carried out in a water bath. Where a large number of regular inspections are needed, it is best to employ a dish made of a heat-resisting alloy cast iron, high in silicon content, mounted in a water bath, the temperature of which is subject to thermostatic control. As an alternative to hydrochloric acid, 10 per cent, nitric acid, or a copper reagent may be used as described below. After the etching is finished, the specimen is thoroughly washed with hot water, rubbed with cotton wool, then cleaned and dried

with benzol. Some metallurgists prefer scrubbing with a stiff brush under the cold water tap, immersion in hot water, treatment with alcohol, followed by drying in the air blast. Lastly, a light rubbing with No. 0 emery paper is advised, because it facilitates examination of the structure.

Alternative Etching Media

It is necessary to point out that not all metallurgists, particularly in Britain, favour hydrochloric acid as the etching medium. It is argued in certain quarters that it may lead to the cracking of a severely stressed steel, e.g., hardened tool steel; but this difficulty can be overcome if the steel is first tempered at approximately 150° to 200°C. before it is immersed in the acid. These metallurgists prefer nitric or sulphuric acid. Alternative etching media suggested include: (i) HCl 38, H₂SO₄ 12, H₂O 50; (ii) H₂SO₄ 20, nitric acid 5.25, H₂O 74.75; these are both used hot. The copper reagents are used cold, and will be dealt with shortly. In the main, however, there appears to be a consensus of opinion that the hydrochloric acid hot solution referred to earlier is the best general etching medium because of its ability to show up such defects and features as segregation, sponginess, gasholes, pipe, seams, cracks, non-metallic inclusions of considerable size, flow lines, direction of crystal flow, flakes, internal cracks, location of welds, changes in the type of metal, e.g., where pieces of one kind of steel are let into another), dendritic structures, enlargement of grain in cast metals, variations in extent of work hardening, decarburisation in hardened tool and other steels, and depth of case. It is not suggested that this solution is the best for every individual defect or feature, but only that it is capable of revealing the widest range. It should be noted that one great advantage of macro-etching is that it enables the metallurgist to decide from what areas of the steel specimens for micro-examination should be taken, and this general applicability of the HCl hot solution is, therefore, of great advantage.

A problem that sometimes arises is a little discoloration caused by the welling up of acid from cracks or pits after the specimen has been dried. The best means of eliminating these discolorations is by steeping the specimen in a cold or slightly warmed 5.2 per cent. solution of sodium or ammonium citrate, followed by rinsing and drying.

Another hot acid that should be used in special circumstances is 10 per cent. hydrochloric acid and 2 per cent. nitric acid solution. The specimen should be immersed in this for 60 minutes at a temperature of 90°C. This solution is used as a rule only for the macro-etching of those steels specially designed for the nitriding process, which are of relatively high aluminium content. There is, however, no general weight

of evidence as yet to confirm the claims made for this medium.

Copper Reagents

The copper reagents, used cold, as stated, are more favoured in Great Britain and Europe than in the United States, and the general view is that except in special cases, they are not so flexible and useful as the hot acid solutions. Two such solutions are: 12 per cent. copper ammonium chloride and HCl in water; 10 gm. cupric chloride, 40 gm. magnesium chloride; 20 c.c. conc. HCl, dissolved in the minimum quantity of water and made up to 1 litre with alcohol.

The first of these two solutions is neutral, and the technique employed consists in leaving the piece in the reagent to eliminate scratches for a few minutes, then washing and brushing to eliminate the film of porous, soft copper left on by this immersion, and the return of the specimen to the reagent. Here it is allowed to remain until evenly coated with fresh copper, after which it is immersed in a solution of 12 per cent. copper ammonium chloride, laced with an addition of HCl. The precise percentage of HCl to be added is governed by the composition of the steel. For relatively rough finished ingot sections, the Heterogeneity of Steel Ingots Committee suggests a final acid content up to 15 per cent. The specimen is rinsed and inspected at intervals as required, then re-immersed, but before it is returned to the etching bath, it must be steeped for a short time in the neutral bath to prevent adhesion of copper, and poor results. Neutral immersion, whenever adopted, must be brief or the surface of the specimen may be made uneven.

The operation requires approximately $\frac{1}{2}$ to 1 hour, but if it is desired that flow lines should be clearly defined, a much longer period, up to 2 hours, may be necessary. After etching is finished, the copper plating is eliminated by rinsing and brushing, and the specimen thoroughly cleaned. A light polishing with No. 0 emery paper will then finish off the surface for examination. The surface is then photographed, or alternatively it is coated with printers' ink, and by means of a dry, rubbered roller, the impression is transferred to a sheet of art paper. The method of illumination adopted is largely decided by the character of the specimen, but some metallurgists claim that vertical illumination is the best. Some contact prints have been made on cellophane, and later employed as photographic negatives. The copper reagent described is advantageous when the primary requirement is the revelation of flow lines and dendritic structures.

Segregation of Phosphorus

The second copper reagent is more suitable for indicating segregation of phosphorus

and banding, but it cannot be employed for large specimens because to prepare the surface for examination after its use a high degree of polish is needed. The specimen is treated in a rather different way, being either immersed or rapidly moved about in the bath, or alternatively the solution may be allowed to fall on it. The result is the deposition of a plating of copper on those areas in which the phosphorus percentage is small, while the areas richer in phosphorus content will be much less thickly coated, so that when illuminated, the high phosphorus areas will show up light if the illumination is vertical, and dark if it is inclined. A rather higher degree of magnification is required.

(To be continued)

China's Metal Output War-Time Statistics

THE end of the war in the Far East will, it is hoped, bring relief to China after nearly ten years of suffering through warfare, invasion and famine. The following details about Free China's production of non-ferrous minerals assume, therefore, special interest. As a result of manifold difficulties, such as high cost of production, lack of modern equipment and skilled technicians, and the loss of Hunan and Kwangsi Provinces to the invader, a noticeable contraction of the country's metal output (illustrated in the appended table) has taken place.

	1942	1943	1944
	(in metric tons)		
Copper (refined)	754	783	185
Lead (refined)	1315	1179	646
Zinc (refined)	343	559	331
Tungsten	11,897	8973	3235
Antimony (pure)	3510	428	203
Tin (refined)	8037	4419	2195
Mercury	163	118	103

The copper mines at Penghsien in Szechwan were closed last year, while copper production at Tunchwan in Yunnan was difficult owing to the shortage of transport facilities, as well as of fuel for smelting operations.

Post-War Plans

According to the Central Planning Board of the Supreme National Defence Council, tungsten production in the first post-war year should aggregate 10,000 tons, increasing to about 15,000 tons after five years. Domestic demand is expected to be from 500 to 1000 tons annually, leaving the remainder for export. As regards antimony, production is to be increased from 3000 tons to 15,000 tons. It may be assumed that in view of the world tin shortage, the Chinese authorities will be anxious to contribute their share to world supplies as soon as possible. According to estimates, over 7000 tons will be produced in the first post-war year, output to be doubled within five years.

The Cornish Mining Industry—II

Advisory Committee's Recommendations

by JOHN H. TROUNSON

(Continued from THE CHEMICAL AGE, August 4, 1945, p. 104)

As previously explained, when the Eastern tin fields fell into the hands of Japan, the Ministry of Supply established the "Control" to foster home production, but early in 1942 a number of local people formed the opinion that this body was proceeding along entirely wrong lines. In an endeavour to assist the war effort and to provide the "Control" with the expert local advice which it so obviously needed, a voluntary committee composed of mining engineers and well-known public men was constituted under the chairmanship of the Lord Lieutenant of Cornwall, Col. E. H. W. Bolitho. This body, styled the "Cornish Tin Mining Advisory Committee," has fulfilled a most useful function, and since its inception has co-operated most helpfully with the official "Control."

In February, 1944, the Advisory Committee submitted to the Government a memorandum on the subject of Cornish mining and the part which it was capable of filling in post-war reconstruction. The President of the Institution of Mining and Metallurgy in a letter to *The Times* on April 13, 1944, supported the Advisory Committee's memorandum and pointed out that attention to the needs of metalliferous mining both at home and in the Empire was long overdue. He hoped that the Government would lose no time in creating the competent minerals and metals organisation the situation urgently demanded, as in the near future political and technical world problems concerning minerals would be crowding in upon the Government. It is, therefore, exceedingly unfortunate that up to the present the Government does not seem to have taken any action on these matters and appears to be quite oblivious of the magnitude of the problems arising.

The Committee's Memorandum

In their memorandum the Advisory Committee show clearly how exceedingly important to the country is a healthy and vigorous metalliferous mining industry. They point out that it not only produces essential metals and so avoids the necessity of paying for an equivalent amount of imported material, but it gives rise to a great amount of employment and contributes in large measure, by taxation, to the revenue of the country. It has been truly said that mining is productive of more employment, both direct and indirect, than any other industry in which man engages. The consumption of coal, electric power, oil, explo-

sives, timber, machinery, and a thousand and one other supplies that enter into metalliferous mining amounts to a surprising figure. It is an indisputable fact, too, that the trained mining engineers which this country has been able to send to every part of the world have constituted an important invisible export inasmuch as these men have secured for this country immense orders for mining machinery and plant. Had there not been a home mining industry it is obvious that Britain would never have secured the tremendous position of importance that she holds in the international mining world to-day with the revenue that accrues therefrom in dividends, salaries, and orders for plant. It is equally true, as a mining engineer of world-wide experience has warned the country recently, that if metalliferous mining in Britain dies out entirely so, surely, will the country lose its lead and influence in international mining to the immense detriment of the community.

However, as the Advisory Committee point out, a large part of the industry now finds itself in such difficulties, thanks largely to the misuse and neglect that it has suffered, that it is unable to help itself. Unless the industry is to be allowed to collapse entirely at an early date it is essential that the Government be willing to render some form of assistance and this would not necessarily require to be merely financial aid. There are many aspects of the industry that require ventilation and urgent consideration, and there is not a moment to waste.

Permanent Commission Required

Recourse to a Royal Commission or other traditional time-wasting method of inquiry would be worse than useless: what is urgently required is action. The Cornish Advisory Committee in their memorandum urge the Government to set up a permanent Metalliferous Mines Commission to foster the metalliferous mining and metallurgical industries in every part of the country. They suggest that the Commission should be vested in a board composed mainly of men conversant with metal mining and metallurgical problems and that in the national interest it should be given wide powers of control over the development and exploitation of the country's metalliferous resources. To enable it to carry out long-term policies the Advisory Committee suggest that the Commission should be supplied with funds in block grants from the Treasury and that it should render annually to the appropriate Minister an account of the expenditure incurred in the various schemes.

together with full reports of progress and development. By these means the Committee consider that a virile and healthy industry would be re-established and the expense to the Exchequer of bringing about this beneficial state of affairs would be repaid many times over in widespread trade, employment, metal production, with taxable income.

If the suggested Mines Commission were already in existence it is improbable that the crisis resulting from the threatened closing of the East Pool mine would ever have arisen. The Commission would be in an authoritative position to review the effect of the closing of that mine with reference to the other factors concerned. If, after careful examination, it found that the abandonment of the mine would endanger the future of the South Crofty mine, too, and that the resulting unemployment and loss of trade would cost the Exchequer far more than the sum necessary to tackle the Tolgus Tunnel scheme, then it would obviously be in the public interest for the Commission to put that scheme into operation forthwith.

A National Disgrace

As matters stand at present, metalliferous mining is the Cinderella of British industries. Thanks largely to official mishandling and neglect it has sunk to small proportions, yet, nevertheless, its importance to the country remains out of all proportion to its size. Had the nation fostered its metalliferous mining industry during the inter-war years, we should not have found ourselves in the dangerous predicament in which we were placed in recent years in regard to the supplies of tin, tungsten, arsenic, lead, and zinc, to mention only a few of the metals which can still be produced in quantity from our own native soil. It is probably common knowledge that, thanks to the national neglect of mining, there is now only one arsenic refinery in operation in the whole of Britain, and that is in Cornwall. In view, however, of the immense reserves of arsenical ores in Cornwall and Devon it was an even more shocking revelation recently that one of the principal reasons for building the small ultra-fast ships to run the German blockade of the Baltic was to bring home to this country desperately needed supplies of arsenic from Sweden. That such a state of affairs should ever have been allowed to develop in a country blessed with an abundance of arsenical and other ores is nothing less than a national disgrace. As sincerely as every right-thinking man hopes that the end of this war will usher in a long period of peace it is crass folly for us as a nation to close our eyes to the fact that the future is clouded in great uncertainty. If after so many warnings we again neglect those home industries on which we are so dependent for prosperity in peace and for our very existence in time of war we shall merit the eclipse that will then surely overtake us.

U.S. Light Metals Congress

Western States' Problems Discussed

A LIGHT Metals Congress was recently held in Seattle, Wash., to discuss the maintenance and integration of the light metals industry in the Western States of the U.S.A. Delegates from eleven States outlined a post-war pattern for placing war plants in private hands. These plants represent an investment of more than one milliard dollars, of which Government-owned aluminium plants amount to \$210,000,000, with an annual capacity of 620,000,000 lb., while the amount invested in three Government magnesium plants exceeds \$150,000,000.

Three plants in Salem, Ore., Salt Lake City, and Cheyenne, produce aluminium from home-mined clay. Seven reduction plants are situated in Riverbank, Torrance, and Troutdale, Calif., and in Longview, Spokane, Tacoma and Vancouver, Wash., besides aluminium forging and extrusion plants, rolling mills, and permanent mould casting plants. The three above-mentioned magnesium plants are in Spokane, Wash., Monteca, Calif., and in Las Vegas, Nev.

In addition to modern reduction plant, cheap power, and skilled labour are available in the Western parts of the United States, where favourable climatic conditions obtain; the congress, therefore, suggested the transfer of some Government-owned plants from the East to the Western States.

Nationalisation in Yugoslavia

Trepca Mines Position

OFFICIAL confirmation has now been received by the Trepca Mines, Ltd., the British company which has opened up and operated lead and zinc mines in Yugoslavia since 1930, that a draft law concerning the cancellation of existing mining concessions in Yugoslavia and the nationalisation of the entire mining wealth of that country has been proposed.

The law states that all mining prospecting rights and all concessions for exploitation of ores and minerals, irrespective of whether they are to be actively exploited or not are to be declared null and void. A clause states that the question of purchase of mining installations by the State or conclusion of new agreements shall be settled by subsequent provisions and discussed with the owners of such installations.

The Yugoslav Minister of Industry has stated that the proposed draft law does not provide for expropriation of invested capital (aggregating about £1,800,000), but that this question would have to be settled later by negotiations with owners.

Alumina from Clay

American Extraction Methods

WHEN in the early days of the war, shipping losses cut imports of bauxite, the principal aluminium-bearing ore, to a point that seriously endangered the aluminium industry, funds were made available by the U.S. War Department for the construction of a pilot plant to extract alumina from abundant American clays, states a note from the Director of National Bureau of Standards (*J. Franklin Inst.*, 1945, 240, 53). Difficulty in obtaining equipment hampered construction, but by May, 1943, a small plant capable of producing about 50 lb. of alumina a day had been built. Since then the plant has been operated and improved, but certain phases, such as calcination of the oxide and recovery of acid, require further work.

The process consists in (1) roasting clay at about 700° C. to render the alumina soluble, (2) leaching the roasted product with dilute hydrochloric acid, (3) filtering to separate the insoluble siliceous matter from the solution containing the aluminum and soluble impurities such as iron and alkali salts, (4) concentrating the solution, (5) precipitating the aluminum as the hydrated chloride from the concentrated solution, (6) removing the crystals of hydrated aluminum chloride by centrifuging in a rubber-coated centrifuge, (7) washing the crystals to remove adhering impurities, (8) calcining the hydrated chloride to obtain alumina and to expel combined hydrochloric acid which is used in the next cycle, and (9) recovering hydrochloric acid from the waste products at the end of the process.

Exceptional Properties

The alumina obtained in this pilot plant has an average purity of about 99.6 per cent., the significant impurities being 0.25 per cent. of chlorine, 0.02 per cent. of iron, and 0.05 per cent. of silicon. This compares favourably with alumina produced from high-grade bauxite ores. For some uses, the alumina possesses exceptional properties, for example, as a polishing material for metallographic specimens and as the raw component of certain heat-resisting enamels.

No recent cost estimate has been made, but about one year ago it was indicated that alumina made by this process would be approximately twice as expensive as the regular commercial product. However, reduction in price of hydrochloric acid when bought in large quantities, and improvement in plant operation should materially reduce this figure should a shortage of bauxite ore ever again threaten the industry.

FUEL TECHNOLOGY

With the August issue of *The Journal of The Institute of Fuel*, the Council has circulated full details of a scheme for the education and certification of fuel technologists. A draft scheme and syllabuses were prepared by the Education Committee of the Institute of Fuel in 1944 in conformity with the proposed constitution for the Institute as set out in its application for a Royal Charter. After approval by the Council the scheme was referred to the City and Guilds of London Institute and an Exploratory Committee was appointed by them "to consider and report on the desirability and feasibility of the Institute holding examinations in fuel technology and related subjects." This committee subsequently recommended that these should be arranged and the scheme and syllabuses now circulated were approved in July last. Full details of the Education Scheme may be obtained from the Institute of Fuel, 30 Bramham Gardens, London, S.W.5.

Atomic Bomb

Research Contracts and Patents

THE following particulars supplement the information on the development of the atomic bomb which appears on p. 194 of this issue:—

The contracts under which research is carried on in university laboratories contain clauses reserving exclusively to the Government all discoveries, inventions and other results arising from the work. In the case of researches carried on by industrial firms all results, inventions and developments in detail applicable within the Tube Alloys field become exclusively the property of the Government. Where an invention is also usable outside Tube Alloys field, provision has been made whereby its use can be made available to industry. It is within the discretion of the Government to decide whether or not a particular use is within or without the field. Questions relating to inventions and patents are dealt with by a Patents Committee with Mr. A. Blok, of the D.S.I.R., as chairman.

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The American Algin Industry*

Two Main Processes Described

THE algin industry in the United States was founded at San Diego, California, in 1926 by a firm which, after a few changes of name, is now known as the Kelco Company. By virtue of intensive research and development work, this firm made considerable improvements in the manufacturing processes, and developed new uses for its products, especially as a stabiliser for ice cream. It is now claimed to be the largest algin producer in the world. Another firm, established about six years ago as the Algin Corporation of America, has its plant located at Rockland, Maine. Like the West Coast concern, this firm produces a highly purified algin. Crude alginous products are made by two other firms especially to serve in feed-water treatment.

United States production of algin in 1941 was estimated to be worth \$1,500,000, representing probably about 2,000,000 lb. Production data since the outbreak of the war have not been released. It is believed that because of the war requirements, algin production has greatly increased.

On the Atlantic Coast two kinds of kelp are utilised: the horsetail (or digitate) kelp, *Laminaria digitata*, and the broadleaf (or sugar) kelp, *Laminaria saccharina*. *Macrocystis pyrifera* is the only kelp used by the Pacific Coast industry, although there are three other giant kelps worthy of being exploited. The *Macrocystis* is truly a "giant" kelp and is undoubtedly the largest seaweed known, growing to over 100 ft. in length and forming extensive beds several square miles in area.

Methods of Harvesting Kelp

Methods of harvesting the giant kelp were inefficient until the mechanical harvester was developed. This machine is a motor barge equipped with a modified mowing machine having a horizontal blade about 4 ft. below the surface of the water. An endless chain elevator hoists the kelp on board. The harvester is placed in the bow, with the blade cutting directly ahead of the boat. The knife, generally 10-20 ft. wide, is considerably shorter than the beam of the boat. The elevator, which is as broad as the swath, is driven at rather high speeds so as to pick up the cut kelp before the waves wash it away. A knife at each end of the elevator and parallel with it serves as an edging device to cut the kelp clear at the sides. A barge of this type can harvest as much as 300 tons of fresh kelp at a single load.

Stanford's original "wet" process for the manufacture of algin is well known in Britain. In the U.S. it has naturally undergone a series of improvements. At present there are two basic patented processes in commercial use there: Green's cold process used at San Diego, and LeGloahec-Herter's process used at Rockland. Both processes have been modified to some extent by the present producers.

Green's Cold Process

The "cold" process of Green (U.S. Pat. 2,036,934) is characterised by the fact that it is largely conducted at the relatively low temperature of 50°F. Freshly harvested kelp is placed in a leaching tank with cold water previously acidulated to 0.33 per cent. hydrochloric acid. The kelp is left in this acid leach water from one to several hours until the salt content is reduced to 5-15 per cent. The liquid is then drained off and discarded.

Leached kelp is chopped into convenient sizes fed to a hammer mill shredder, and then placed in a digestion tank containing 40-50 lb. of soda ash in solution per ton of freshly harvested kelp. The pH is controlled at about 10; digestion is usually completed in 30 minutes. The kelp is further digested by a similar process for another half-hour. The resulting pulp is again passed through a hammer mill shredder and six volumes of treated water added. The pH is maintained at 9.6-11.

Where crude sodium alginate is satisfactory, the fibrous material is dried and sold as such. For most purposes, however, a highly purified product free from cellulose and other impurities is required. For a pure product, the crude liquor is pumped into a clarification tank and a filter aid, such as diatomaceous earth, added. The supernatant liquor is filtered through an ordinary mechanical filter-press. The temperature may now be temporarily raised to about 120°F. to aid filtration. Other methods of clarification that can be used include centrifuging, vacuum-filtering, sand-filtering, or settling of the cellulose material.

Filtered liquor is slowly added to a 10-1 per cent. calcium chloride solution under constant agitation. Calcium chloride is used in the proportion of about 100 lb. to 8 tons of the alginate liquor. When agitation stops, precipitated calcium alginate gradually rises to the top. The remaining liquor, containing water soluble salts and organic matter, is drained off.

More water is now added to the precipitate in the same tank and a bleaching agent such as sodium hypochlorite introduced. The

* From an article by C. K. Tseng, Scripps Institute of Oceanography, La Jolla, California, in *Chem. Met. Eng.*, 1945, 52, 6, p. 97.

amount of hypochlorite added depends on the colour of the crude product; generally, 1 per cent. is sufficient. Excessive bleaching will have an adverse effect on the final product.

Bleached calcium alginate precipitate is separated from the water and introduced into a 5 per cent. hydrochloric acid solution. About 42 parts of the acid solution is used for each part of the alginate. The acid converts the calcium alginate into fibrous alginic acid. The slurry is passed through a screen to remove excess acid and calcium chloride resulting from the chemical reaction. The drained alginic acid precipitate is introduced into a second tank of acidulated water, agitated, then pumped over another screen. This treatment is repeated until the precipitate is washed free of calcium salts. Enough treated water is used in each washing to raise the pH above 1.9 and simultaneously to reduce the amount of calcium in the product.

Purified alginic acid is filtered and stored in a refrigerated room or converted into the sodium or other salts by treating with the corresponding carbonate, oxide or hydroxide. The alginate thus formed is dried by standard methods, ground, screened, and packaged or mixed with other ingredients to form one of several commercial products.

LeGloachec-Herter Process

The LeGloachec-Herter process (U.S. Pat. 2,128,551) takes advantage of the fact that a dilute solution of alkaline earth salts such as calcium chloride will dissolve laminarin, mannitol and other salts in the kelp without any harmful effect on the algin.

Kelp used in this process may be freshly harvested or air dried. To one volume of dried kelp, three volumes of 0.8-1.0 per cent. calcium chloride solution are added. Lixivation may be carried out hot or cold, the latter being preferred. Leached kelp is then washed with softened water to remove the calcium chloride as well as the remainder of the laminarin, mannitol and other salts. Washing is stopped when the wash water contains about 0.5 per cent soluble matter. The washed kelp may be subjected to an additional treatment with 5 per cent. hydrochloric acid to dissolve any residual alkaline earth salts. It is then washed with softened water before digestion.

To one volume of the well-lixiviated kelp, two volumes of 4 per cent. soda ash solution are added. Digestion may be performed in any suitable vessel, the mixing being helped by beaters such as those commonly used in pulp making. Maceration is continued until the cellulose is reduced to fine particles and a homogeneous paste obtained. This will take about 2 hours at 104°F. and about 3 hours at room temperature.

The kelp paste is diluted with water in the ratio of 3.7. The mixture is beaten to a homo-

geneous suspension and air introduced through fine apertures to stir up the whole mass vigorously. It is claimed that oxygen in the air helps to make a product of high viscosity. If oxidising agents such as ozone or hydrogen peroxide are introduced, mechanical agitators are used. The liquor is then passed continuously at high speed through a centrifuge which charges it with air bubbles. The resulting emulsion is conveyed to a clarification tank where, after standing for 6-10 hrs., the cellulose particles agglomerate to a compact floating cake. The clarified liquor can then be removed without difficulty.

Clarified crude liquor, still coloured by seaweed pigments, must be purified to yield a white product. An adsorbent jelly made of hydrated alumina, gelatinous silica and aluminum alginate is preferred, although other similar ones can be used. The jelly is added to the coloured liquor in about 20-25 per cent. of the weight of dry alginous material. The mixture is stirred and the pigments soon adhere to the jelly. This can be removed by centrifuging and reclaimed by various methods, such as by washing with alcohol or other organic solvents.

The liquor is now clarified and freed from pigments and other impurities. Addition of a strong acid; such as hydrochloric maintained at a pH of 2.8-3.2 will precipitate alginic acid. The mineral acid and the alginous liquor are introduced separately to meet in a mixing baffle, slightly inclined inside a tank. The precipitate flows at once to the adjoining tank, thus minimising contact with fresh mineral acid, which tends to have an adverse effect on the final product. Carbon dioxide evolved from the reaction between soda ash and hydrochloric acid helps the precipitate of alginic-acid to float and thus overflow into the next tank.

This precipitate of alginic acid is placed in baskets and allowed to drain. Freed from the remaining liquor by pressing or centrifuging, it is comminuted and further purified by washing with solvents such as ethanol in a vessel provided with a filter plate. Purification of precipitated alginic acid by ordinary dialysis or by electrodialysis has been suggested.

Purified alginic acid, containing some adhering alcohol, is dried in a specially constructed oven at 150-170°F. A method of purifying and drying the alginic acid in special rotating drums has been suggested. In both cases, the alcohol may be reclaimed. Alginic acid is converted into its sodium or other salts by the regular process.

Other Processes

Methods for the recovery of laminarin and iodine are also patented (U.S. Pats. 2,188,092 and 2,233,787). In another process (U.S. Pat. 2,163,147) for improving the decolorisation of the alginous material, form-

aldehyde, tannic acid or other protein coagulants are added to the soda-digested kelp. The proteinaceous material coagulates and adheres to the cellulose, while the seaweed pigments become fixed to this coagulated mass. Chlorophyll and other plant pigments may then be recovered if so desired. Some 22 lb. of commercial formaldehyde is added to 2.5 tons of water for each ton of demineralised kelp. The mixture is allowed to stand for about an hour. The treated kelp is then taken out and stored for 15-21 days, causing substantial fixation of the coloured matter on the protein-cellulose mixture. When soda ash solution is added to the kelp, it dissolves only the alginous matter, which can thus be separated from both the cellulose and the pigments. The process from this point is the same as already described, except that decolorisation by alumina-silica-alginate jelly is omitted.

German Work on Lubricants

Phenyldodecene

IN the course of work on the hydrocarbon homologues, particularly with regard to lubricating properties, isomeric phenyldodecene and phenyldodecene, which differ in the location of the phenyl group, were investigated by A. W. Schmidt and A. Grosser (*Ber.*, 1942, 75, 829). The compounds were prepared, using Grignard's reaction, from *n*-alkyl magnesium chloride and phenyl alkyl ketones, by which initially the alcohols (which were not isolated) were obtained. From these, the water was split by KHSO_4 at 120°-160°C. From the phenyldodecenes obtained, after hydrogenation using palladium on barium sulphate as catalyst, the corresponding phenyldodecane was obtained. While the density and refractive indices of the isomers showed no characteristic differences, the viscosity properties clearly showed divergencies, for which rules could be formulated. The nearer the phenyl group migrated to the middle of the 12-carbon chain, the steeper was the viscosity curve, found by the Ubbelohde-Walther method. If the differences in the constitution are so regarded that by substitution in the long carbon chain, a shorter, branched chain is obtained, it follows that this branched chain does not affect the viscosity properties according to its carbon number, but acts more like two short chains.

Long-Chain Diphenyl Compounds

The same authors (*Ibid.*, 826) had previously shown that in a series of hydrocarbon homologues, the viscosity properties as regards suitability for lubricating materials, become better with lengthening unbranched carbon chains, while at the same time the melting point rose and thus became more

unfavourable. From references in the literature, it can be accepted that with certain diphenylalkanes, the melting point decreases with increasing molecular weight. Consequently, some of the higher members of these diphenylalkanes were prepared in order to follow up this phenomenon more closely, in the region of higher molecular weight.

Using the Friedel-Crafts reaction, the diketones were prepared from the dicarboxylic acids with 6, 10-³ and 18 carbon atoms; these were then reduced with aluminium isopropylate. Diols and diolefines were obtained as intermediate products. Hydrogenation to saturated hydrocarbons followed, using palladium on barium sulphate as a catalyst. In the case of the 1, 10 diphenyldecane, hydrogenation of the phenyl groups was also effected with platinum oxide. The melting-point curves of the three diphenyldecanes showed a minimum, assumed to lie at about 12 to 14 carbon atoms. A corresponding behaviour was shown by the melting points of the diketones and diols. It is the opinion of the authors that the low solidification points of the mineral oils are to be ascribed to a mixture effect, as even a hydrocarbon of the homologue series examined, in the region of the molecular weight of lubricating oils, would show a comparatively high melting point.

IRIDIUM CARBONYLS

If carbon monoxide is passed over the monohydrate of iridium chloride at normal pressures, a mixed reaction product sublimes at 150°C., which, beside $\text{Ir}(\text{CO})_2\text{Cl}_2$, also contains $\text{Ir}(\text{CO})_3\text{Cl}$ and $[\text{Ir}(\text{CO})_3]_x$, according to Hieber, Lagally, and Mayer (*Z. anorg. allg. Chem.*, 1941, 246, 138). The chlorine which is freed is converted into COCl . The corresponding bromine and iodine compounds may be prepared, but, in the case of the iodide, free iodine is formed. The products which are obtained are members of a series, one end of which is represented by iridium trihalide and the other end by $[\text{Ir}(\text{CO})_3]_x$. The reactive influence of the water of hydration of the iridium chloride is worthy of mention; starting from the anhydrous salt, only traces of carbonyl are obtained. In addition, the presence of a halogen-fixing bi-metal acts favourably on the course of the reaction. Furthermore, the reaction does not proceed to complete utilisation of the trichloride, a fact which is ascribed to changes in surface characteristics. The separation and purification of the carbon monoxide compounds was affected by fractional sublimation.

Copper-Cobalt Alloys

Report on American Work

TO prepare a workable alloy of equal parts of copper and cobalt has so far not met with success when resorting to ordinary fusion processes. Attempts were made to prepare such an alloy by two other methods, and the results of this investigation were reported by G. Fink and J. L. Hutton before the annual meeting of the Electro-Chemical Society of America.

The binary alloys of copper and nickel are well known, and many of them find extensive commercial application. But the binary alloys of copper and cobalt are practically unknown. In most investigations on high-melting alloys, the surrounding atmosphere during melting is carbon monoxide. Since both metals form carbonyls, and thereby indicate their affinity for carbon monoxide, the elimination of CO during the preparation of the desired cobalt-copper alloys might lead to entirely different results. There were two approaches open: (i) electro-chemical co-deposition of the two metals; (ii) alloying in an atmosphere of hydrogen. No true alloy was obtained in co-deposition. The deposit was either substantially cobalt or substantially copper, depending upon relatively slight variations in pH, current density, bath temperature, and metal ion concentration and proportion. It seems possible to obtain, by co-deposition, a true cobalt-copper alloy of, say, equal parts by weight, provided the cathode film pH and the cobalt to copper ion proportion were closely regulated and controlled. Such further study is contemplated.

Alloying in Hydrogen Atmosphere

Efforts to alloy in an atmosphere of hydrogen could be summarised as follows: Microscopic examination and some physical tests of a series of cobalt-copper alloys prepared from powders which were compacted at pressures ranging from 1 to 100 tons per sq. in. and sintered in hydrogen at temperatures from 900°-1090°C. indicate that solubility of copper in cobalt was nearly 10 per cent. at room temperature, while solubility of cobalt in copper was probably less than 3 per cent. Even with this low concentration of cobalt, fine suspensions of individual particles could be distinguished in the grains of copper. Cold work prior to alloying did not appreciably affect solubility. The presence of a solid solution or of a compound was suspected in 50:50 alloys heated to the melting point of copper or above, but the real nature of this constituent could not be established. Alloys consisting of 3 per cent. cobalt and 97 per cent copper exhibited a high degree of plasticity in rolling. They could be reduced into strips 40 times thinner than the pellets.

French Chemical Notes

Wholesale Price Indices

SINCE reference was made in THE CHEMICAL AGE of August 18 to the slow improvement in France's chemical industry, news has been received that the industry is still hampered by the shortage of coal, but that the transport situation is improving. Measures have been taken to curtail the delays in deliveries of pyrites allotted second priorities. Agricultural sulphur is to have the same priority as sugar, oil and oil-cake. Increases have taken place in the output of stearine, oleine and glycerine. Production of window glass and plate glass is being maintained at figures higher than the average monthly output in 1938, while production of bottles and flasks has increased slightly. The manufacture of pharmaceutical specialities is restricted by the lack of sugar and fats.

Accounts of the Société des Matières Colorantes et Produits Chimiques de Saint-Denis show a loss for 1944 of 816,914 francs, compared with a profit of 13,538,473 francs in 1943, when a dividend of 42.50 francs gross was distributed. The plants at Saint-Denis and Bordeaux have not suffered any serious war damage. Current conditions have led the board of the Société des Phosphates du Dyr to defer the inauguration of new centres of activity in Tunisia, and to surrender the concession at Kalat-es-Senam. The company is concentrating on the production of artificial fertilisers, and has interested itself in a new enterprise manufacturing constructional materials from a basis of straw and rushes. The loss for 1943, amounting to 679,935 francs, gives a total debit balance carried forward of 1,201,935 francs. Profits of the Société des Produits Organo-Chimiques for the extraordinary period from September 30, 1943, to May 30, 1945, amounted to 1,665,670 francs. An ordinary dividend of 21 francs, and a preference dividend of 8.45 francs were paid.

BRITISH COKE RESEARCH ASSOCIATION

A full record of the Council, committees, and representative panels of the British Coke Research Association are contained in the first issue of the Association's *Bulletin*, which thus becomes a valuable handbook for all connected with the by-products industry.

Reference is made to the Research Committee, and there is a report of the Association's recent first conference at Leeds. Details are included of the activities of the area Research Committees.

A CHEMIST'S BOOKSHELF

COLLECTED PAPERS ON METALLURGICAL ANALYSIS BY THE SPECTROGRAPH. Edited by D. N. Smith. London: British Non-Ferrous Metals Research Association, Euston Street, London, N.W.1. Pp.X + 162. 21s.

This volume is a symposium of thirteen papers, contributed by outstanding authorities in this new field of rapidly growing importance. Photographic methods, the analysis of aluminium alloys, of lead and lead alloys, and research problems of fundamental importance are some of the subjects dealt with. The contributors, mostly representatives of the metal industries, co-operated in the compilation of this useful standard test manual, which provides pertinent information for chemists in the metal and related trades. The contribution from the British Aluminium Company, Ltd., differs from the others in that it is much more comprehensive in its scope. Numerous tables, diagrams, figures and references are included in this valuable publication.

Parliamentary Topics**Atomic Bomb**

IT was to be expected that among questions dealing with scientific and industrial problems, those relating to the atomic bomb would receive considerable attention by members of the new House of Commons. For example, Sir Wavell Wakefield asked the Prime Minister whether he could state what machinery, organisation or arrangement was proposed for the scientific development for peacetime use of the knowledge obtained in the evolution of the atomic bomb; and the extent of the finance and scientific manpower to be made available for this purpose.

The Prime Minister replied that research on the possible use of atomic energy will continue for the present to be carried on under the existing organisation known as the Tube Alloys Directorate of the D.S.I.R. The resources made available would depend on the programme of research adopted, and this was now under consideration.

Sir W. Smithers asked the Prime Minister whether he would give an assurance that the secrets of the manufacture of the atomic bomb shall not be disclosed to any other Power without first obtaining the consent of the House.

The Prime Minister: Before they reach any decision on this matter, the Government will wish to have such advice as the newly-appointed Advisory Committee can offer, and they must, of course, move in concert with the Government of the United States. As regards the second part of the question, I

am unable to give a specific undertaking, but I can assure the House that the Government will wish to pay full regard to the views of hon. Members.

Science Students

In reply to questions by Sir Waldron Smithers and Mr. Henderson Stewart, the Minister of Labour declined to offer special facilities for the early release of Servicemen who had begun their University courses in science before joining up. He pointed out that a scheme of reservation and deferment had been in operation for these students throughout the war.

ENEMY-OWNED PATENTS

The Chartered Institute of Patent Agents has issued a memorandum containing its recommendations dealing with the position of enemy-owned Patents and Patent Applications, and certain other matters arising from war conditions. The principal recommendations include:

(a) No action to deny Convention rights after the war;

(b) Denial of any moratorium to enemy owners of British applications pending at the outbreak of war which should remain dead, subject to the exception discussed above;

(c) Denial of any moratorium to enemy owners of lapsed British patents;

(d) No extension beyond ordinary term for enemies to file Convention applications here;

(e) Enemy-owned British patents retained in force by British licensees to be taken over by the Custodian of Enemy Property with power to assign patents to exclusive licensees;

(f) Dating of patents filed under an extended Convention period allowed by moratorium to be, for purposes of Section 17 (Term of Patent), twelve months from date of basic application;

(g) Section 27 (2) (d) (Abuse of Monopolies) to apply after the date of sealing of British patent where delayed Convention filing is granted under a moratorium or Emergency Act.

Copies of the memorandum are available on request from the Institute, Staple Inn Buildings, High Holborn, London, W.C.1.

The Ministry of Supply announces that, subject to the disposal of existing stocks of sulphite lye by its Sundry Materials Branch, further requirements of this commodity, which United Kingdom producers are unable to meet, may be imported by private traders, who must first procure an import licence from the Board of Trade.

Personal Notes

MR. J. O. WHITMEE has been invited to join the board of Tate & Lyle, Ltd.

MR. F. T. PERRY has been elected president of the Australian Metal Industries Association.

MR. R. J. BARRITT, A.M.I.Chem.E., has been appointed chief chemical engineer to Powell Duffryn, Ltd.

MR. B. T. RUMBLE has been elected chairman of Fullers' Earth Union, in succession to the late Mr. J. S. Highfield.

MR. J. C. A. FAURE has been appointed chief executive of the raw materials section of Lever Brothers and Unilever.

DR. H. J. GOUGH, F.R.S., formerly chief scientific officer to the M.O.S., has accepted an invitation to join Lever Brothers & Unilever, Ltd., as engineer-in-chief.

MR. E. HUNTER, president-elect of the British Iron and Steel Federation, will now take up his position following the death of Sir Allan Macdiarmid.

MAJOR V. F. GLOAG, M.C., M.I.Chem.E., a director of Simon-Carves, Ltd., Cheadle Heath, has been appointed London director of the company.

LT.-COL. S. H. PIERSENNE, who has recently been appointed general director of the Conservative Central Office, is a director of Brotherton & Co., Ltd.

DR. C. J. T. CRONSHAW, a director of Imperial Chemical Industries, British Nylon Spinners, and other companies, has been appointed to the board of the District Bank.

DR. F. ROFFEY has been appointed Controller of research and development in the Distillers Company, Ltd. He was formerly Controller of chemical research and development in the Ministry of Supply.

MR. S. W. MARTIN, has been appointed general manager of the Devonshire works of the Staveley Coal & Iron Co., Ltd., and of the British Soda Co., in succession to MR. C. E. WHITEHEAD, who recently retired after being general manager for 17 years.

MR. H. KRALL, F.R.I.C., Professor of Chemistry in Agra College, Agra, India, and a member of the Indian Advisory Committee of the Royal Institute of Chemistry, has retired after 32 years' service in India, and will live in Cambridge.

PROFESSOR R. ADAMS, head of the chemistry department of the University of Illinois, and chairman of the board of directors of the A.C.S., has been awarded the honorary degree of doctor of science by Harvard University.

DR. C. DREYFUS has been elected chairman of the Celanese Corporation of America and will continue to act as the chief execu-

tive officer of the company. MR. W. McC. CAMFRON and MR. J. A. LARKIN were elected first and second vice-chairman respectively, and MR. H. BLANCHE elected president.

MR. W. E. PRYTERCH has relinquished his position as Technical Director of High Duty Alloys, Ltd., and intends to act as an independent research consultant. In particular, he will act in that capacity for the group of companies which Col. W. C. Devereux is at present forming.

MR. T. P. WARD, who has been associated for a number of years with Messrs. George Cohen, Sons & Co., Ltd., as manager of the Chemical Plant Section, has resigned his position in order to take up that of managing director of Messrs. Morton, Son & Ward, Ltd., Dobcross, near Oldham, Lancs.

Obituary

DR. A. SIMEK, Professor of Physical Chemistry at Brno University, has been executed by the Germans during the war.

DR. CYRIL KRAUZ, Professor of Applied Chemistry and Technology at Prague Technical University since 1920, died during the war. He was a well-known industrial chemist, author of a treatise on organic chemistry and an authority on "drying oils" and explosives. He acted as technical adviser to the Czechoslovak Government.

Iron and Steel Output

M.O.S. Figures

CERTAIN iron and steel production figures are now being disclosed by the Iron and Steel Control of the Ministry of Supply. They will be issued monthly, and those for the past seven months of 1945, have recently been announced.

The weekly average of pig-iron produced in July was 134,800 tons, with an annual rate of 7,010,000 tons, compared with June's weekly average of 132,800 tons and annual rate of 6,906,000 tons. The highest figures in the seven months was in March, when the figures were 141,400 and 7,354,000 tons. In January they were 127,000 and 6,611,000.

July's weekly average of steel ingots and castings was 213,800 tons (annual rate 11,118,000 tons.) The May production was lower, giving 210,800 tons weekly average and 10,962,000 tons annual rate. March steel figures were also best in the period, 246,100 tons weekly average and 12,799,000 tons annual rate.

A new world record monthly output of pig iron for one blast furnace was established in July by a stack at the Carnegie-Illinois Steel Works, Braddock, Pa., which turned out 50,590 net tons of pig iron.

General News

Purchase tax on copper domestic hollow-ware is to be reduced from 33½ per cent. to 16½ per cent., states a Treasury notice.

The Postmaster-General announces that the parcel-post service to Switzerland and to Sweden has been restored.

The total value of chemicals, drugs, perfumery, dyes and colours imported into Eire during June was £165,569, compared with £104,768 in June 1944. Figures for the six months January-June were £818,314 (1945) and £719,182 (1944).

The I.C.I. have pointed out, in answer to an inquiry by Linlithgow Town Council, that there is little likelihood of any division of the I.C.I. taking over the Regent factory since the Ministry of Aircraft Production had certain rights in regard to the factory.

The Northern Ireland House of Commons has passed a money resolution authorising the expenditure of up to £2,000,000 under the Industries Development Act, the purpose of which is to assist the establishment or development of industrial undertakings.

Dispensing chemists are being urged by the Pharmaceutical Society not to sell chemicals for explosives to children under 16. The Home Office and the Society are reported to take a grave view of the number of accidents resulting from the making of fireworks by young children, and makers of "chemical outfits" are being asked to remove from them any of the banned explosives.

The Board of Trade wish to make it clear to traders that there is full freedom of business communications with Holland, Norway, Greece, Yugoslavia, Czechoslovakia and Poland, subject to the requirements of Trading with the Enemy legislation. This means that it is not possible to enter into firm commitments regarding the exchange of goods or the making of payments, but that correspondence is permitted regarding such matters as prices and terms of delivery in anticipation of the resumption of trade.

The first cargo of Swedish iron ore to arrive in Scotland since the declaration of war, docked at Rothesay Dock last week. The 12,000 tons cargo was carried by the Swedish ship *Malmåland*, a dual-purpose vessel devised by the Brostrom concern. This and a sister ship have been designed as combined ore-carriers and tankers, taking ore on the outward trip and bringing back oil cargoes by which means the freightage

From Week to Week

costs can be substantially reduced. The ore holds are placed high and can be rapidly converted to carry oil. Extra wide holds permit the fullest use of large-scale unloading facilities.

The formal proceedings of the 1945 Conference of "Aslib" will open on September 15, at the Portland Hall (Polytechnic Extension Buildings, Little Titchfield Street, London, W.C.1). A conversazione for members and their guests will be held at the Royal Institute of British Architects on September 14, at 8 p.m.

Foreign News

A new oil town, named Okha, has been built in Soviet Sakhalin in recent years.

The U.S. foreign economic administration announces that it does not intend to renew present contracts for foreign copper.

Controls on the production of nylon have been lifted by the U.S. War Production Board.

A new oil company is to be formed jointly by Soviet and Rumanian interests, reports *The Financial News*.

Orders placed by Brazil in the United States for oil-drilling equipment, should step up output of crude oil to 100,000 litres daily.

The Celanese Corporation of America is to expand materially its cellulose acetate producing facilities at Celco, Va.

Practically all war-time restrictions on the sale and purchase of petroleum products have been removed by the U.S. Petroleum Administration for War.

Scientific and industrial information gained from Germany and Japan is to be released and freely disseminated, according to an executive order by President Truman.

The magnesium plant constructed at Ludington, Mich., at a cost of \$18,000,000, by the Defense Plant Corporation, has been leased to the Dow Chemical Company.

In Canada, restrictions on the use and distribution of nickel metal products, primary cadmium and cadmium-plating have been removed.

A party of Soviet industrial and mining experts have arrived in Chungking for talks with the Chinese War Production Board and the Ministry of Economic Affairs, on co-operation between the two countries.

Zinc prospects in Tennessee and Virginia have recently been the object of an investigation by the U.S. Geological Survey. The Arcadia zinc area in Scott County, Va., has already been mapped in order to assist in the exploration of this deposit.

A new thermosetting plastic, called Kriston, has been developed by the B. F. Goodrich Chemical Co. The new product is reported to have good physical properties for lenses, prisms, and transparent sheets, and for making moulded parts for the electrical industry.

The Chemical Market Research Group, which has operated for the last six years as an informal organisation of U.S. Chemical Market Research Executives and Chemical Market Economists, has recently been formally organised as The Chemical Market Research Association.

United States iron mines and mills produced and shipped 94,117,705 gross tons, and 95,135,675 tons, respectively, in 1944, according to the Bureau of Mines. Output of iron ore came from 224 mines, of which 26 mined over one million tons of crude ore each. The average ore value per ton at mines was \$2.70.

The establishment of laboratories, pilot plants, and experimental shops, designed to stimulate technological advances in a large number of industrial fields, is one of the important reconversion aims of the War Production Board, according to an announcement by the chairman.

A new insecticide, prepared from a tropical plant known as *Ryania speciosa*, is, according to U.S. reports, an efficient means of combatting the corn borer. A 50 per cent. dust of this insecticide is reported to be equal in value to DDT, at a price of 1 per cent. rotenone dust.

To speed up reconversion activities, industrial construction in the United States may be undertaken without authorisation by the U.S. War Production Board. The list of types of work includes mining, smelting and refining, foundries, and other operations related to the extraction of minerals and their conversion, pilot plants, and industrial research laboratories.

Metal Statistics 1945, published by American Metal Market, 18 Cliff Street, New York, 7, contains 800 pages of general statistical information on ferrous and non-ferrous metals and their alloys as well as on miscellaneous economic subjects. It deals with prices and world production and consumption, but information on most foreign countries is likely to remain obscure until some time after the war. The book also contains a buyers' directory and an alphabetical list of products.

In the synthetic oil plant of the Ruhrchemie A.G., at Oberhausen, 600 workers are at present employed in the manufacture of oxygen for medical purposes, as well as of artificial fertilisers. The plant is expected to employ 2000 men in the near future.

Of the 45,000 patents and patent applications seized by the U.S. Government from enemy aliens and nationals of occupied countries, 9,366 have been licensed to 760 American firms and individuals. Products valued at more than \$150,000,000, largely war goods, have already been produced from them. The Midwest Research Institute, at Kansas City, is the only private agency to be used by the Government as a depository for the seized patents.

A conference, dealing with the reconstruction of Poland's chemical industry, has recently been held in Gliwicz in Upper Silesia. Subjects discussed included requirements of the nitrogen industry, the return of machinery removed by the Germans, the use of German patents and production methods, and labour questions. A special resolution asked for the transfer of a complete nitrogen plant from Germany.

Boron trichloride is reported to improve the mechanical properties of aluminium recovered from scrap. According to the Cooper Metallurgical Laboratory, Cleveland, Ohio, gaseous boron trichloride should be passed through the molten metal immediately before pouring, in order to remove oxides, nitrides and carbides. The same treatment is reported to reduce the grain size and porosity of the casting.

Forthcoming Events

September 7. Society of Chemical Industry (Food Group). Members of the Group have been kindly invited by Roche Products, Ltd., to a semi-social summer meeting at their factories at Welwyn Garden City, Herts. The meeting, to which ladies are invited, starts at 11 a.m. with a visit to the Research and Pharmaceutical Departments. A lecture on the large-scale synthesis of certain vitamins and their use in enriching food will precede a visit to the factories in the afternoon. Luncheon will be available at 5s. each (payable at table) to members and their friends; tea will be provided by Roche Products, Ltd.

September 12. The Institute of Metals. 4 Grosvenor Gardens, London, S.W.1. Annual autumn meeting. Institution of Mechanical Engineers, Storey's Gate, London, S.W.1. 10.0 a.m.-12.45 p.m.: Formal business, and Mr. L. de Brouckère: "An Electron-Diffraction Study of the Atmospheric Oxidation of Aluminium, Magnesium and Aluminium-Magnesium Alloys." Mr. H. A. Sloman: "The Application of the Vacuum-

Fusion Method to the Determination of the Oxygen, Hydrogen and Nitrogen Contents of Non-Ferrous Metals, Alloys and Powders," and Mr. J. C. Chaston: "Some Effects of Oxygen in Silver and Silver Alloys." 2.15 p.m.-4.0 p.m. Mr. W. A. Baker: "Microporosity in Magnesium Alloy Castings," and Mr. F. A. Fox: "The Properties of Some Magnesium-Aluminium-Zinc Casting Alloys and the Incidence of Microporosity."

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1906 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

HILDEN LABORATORIES, LTD., London, E.C., scientific instrument manufacturers, etc. (M., 1/9/45.) August 7, mortgage to Barclays Bank, Ltd., securing all moneys due or to become due to the Bank; charged on 2 Bank Buildings, Cranleigh.

JOSHUA REA & SONS, LTD., Liverpool, oil and colour manufacturers. (M., 1/9/45.) August 2, mortgage and charge, to Midland Bank, Ltd., securing all moneys due or to become due to the Bank; charged on 29-39 Collingwood Street, Liverpool, and general charge.

TYNE CHEMICAL CO., LTD., South Shields. (M., 1/9/45.) August 9, debenture to Barclays Bank, Ltd., securing all moneys due or to become due to the Bank; general charge. *Nil. April 13, 1944.

Satisfaction

JAMES E. SMITH (WAKEFIELD), LTD., chemical manufacturers. (M.S., 1/9/45.) Satisfaction August 8, of mortgage registered March 8, 1945.

Company News

The British Oxygen Co., Ltd., announces an interim ordinary dividend of 8 per cent. (same).

The Beecham Group, Ltd., has declared a first interim dividend of $1\frac{1}{2}$ per cent. on the deferred shares.

The Indian Copper Corporation, Ltd., reports a net profit for 1944, of £58,955 (£95,871). A dividend of 10 per cent. (same) has been declared.

The Geevor Tin Mines, Ltd., report a net profit, for the year to March 31, of £16,549 (£19,551). A final ordinary dividend of 3d. per $\frac{1}{8}$ s. share, making 6d. ($7\frac{1}{2}$ d) has been declared.

The Bradford Dyers' Association, Ltd., has declared the dividend for the half-year ended June 30, on the 5 per cent. cumulative preference stock, but the payment of an ordinary dividend will be dealt with when the accounts for the full year are available.

Lacrinoid Products, Ltd. announce that, owing to the work and expense involved in the payment of interim dividends, which has been accentuated by the recent increase of capital, they have decided to discontinue the practice forthwith. This change does not imply that there will be any alteration in the rate of dividend for the current year, which the directors anticipate will be at the same rate as for previous years.

New Companies Registered

Brondex Chemicals, Ltd. (397,847).—Private company. Capital £1000 in £1 shares. To acquire the business carried on by J. A. Sparkes, as "Brondex Chemicals," at 36 Cromwell Road, Newport, Mon. Directors: J. A. Sparkes, W. G. Russell. Registered office: 36 Cromwell Road, Newport, Mon.

Chemical and Allied Stocks and Shares

SENTIMENT in stock markets was aided by the upward trend maintained by British Funds, but business generally was on a small scale because of the disposition to await the negotiations following the ending of lend-lease. The latter had not been expected so soon, and has resulted in a difficult position. Whatever the outcome of the negotiations, it is now generally realised that the latest developments emphasise the necessity of making every effort to expand Britain's export trade and to speed up the change-over to peace-time production. Much will, of course, depend on the supply of skilled labour and materials and on the question of Government controls. Chinese bonds, Argentine rails and gold mining shares have claimed more attention, and in contrast, industrial shares have been subdued, with prices tending to ease in the absence of improved demand, although little selling was reported. Home rails also eased.

A good feature was further recovery in iron-coal shares on the general belief that the recent decline in prices had been carried too far. Moreover, a number of dividend announcements served to draw attention to the large yields obtainable. Richard

Thomas & Baldwins 6s. 8d. shares were firm at 12s. 4½d. on the unchanged 12½ per cent. dividend and higher profits. The latter include profits from Baldwins' works, but not earnings of associated companies and overseas subsidiaries also taken over at the time of the merger. Guest Keen moved up to 38s. 9d., United Steel to 24s., Hopkinsons to 88s. 9d., Babcock & Wilcox to 56s. 6d., Powell Duffryn to 22s. 3d., and Allied Iron-founders to 51s. 3d.

Reflecting the easier tendency in leading industrials, Imperial Chemical at 38s. were slightly lower on balance, while Courtaulds were 53s. 6d., Turner & Newall 78s. 3d., United Molasses 42s., and Dunlop Rubber 50s. 9d. Electric equipment shares, however, were favoured on export trade prospects, General Electric rising to 94s. 9d., English Electric to 54s. 9d., and Associated Electric to 55s. 9d. Among textiles, Bleachers eased to 14s. 3d., Bradford Dyers to 26s. 4½d., and Calico Printers to 20s. Elsewhere, the units of the Distillers Co. were relatively steady at 114s. 9d., while Murex rose further to 101s. 3d. British Aluminium showed steadiness at 43s. 3d., and Borax Consolidated deferred were higher at 42s. 3d.

Greiff-Chemicals Holdings 5s. shares remained at 9s. B. Laporte were 87s., W. J. Bush 75s., while British Drug shares were more active with dealings up to 39s. 1½d. Burt Boulton were 26s., Cellon 26s. 3d., and Monsanto Chemicals 5½ per cent. preference again 23s. British Industrial Plastics 2s. shares kept fairly active around 6s. 6d., and Erinoid 5s. shares were quoted at 11s. 3d., with De La Rue at £10½. Wall Paper Manufacturers deferred firm up to 39s. 9d., and International Paint were 117s. 6d.

Boots Drug at 54s. recorded little change on balance, Sangers were 30s. 6d., and Timothy Whites have been 42s. 3d., awaiting the financial results. Beechams deferred strengthened to 19s. 6d. on the unchanged interim dividend. Elsewhere, shares of the Metal Box Co. were higher at 90s. 3d., and General Refractories improved to 16s. 3d., the favourable views being taken that in due course, dividends may return to best pre-war levels, bearing in mind the big modernisation plans for the iron and steel industry, and other indications of a good demand for the company's non-insulating materials, etc. Oil shares moved back moderately, both Shell and Burmah Oil being 82s. 6d.

British Chemical Prices

Market Reports

THERE is a slight improvement in conditions in the London general chemicals market and fresh inquiry has been brisk. Actual new business has been on a fair scale and deliveries against contracts have been well up to schedule. The price position throughout the market remains steady and the undertone is firm. Among the soda products, the sulphides are in good demand, while both acetate and nitrate of soda have been the subject of fresh inquiry. Chlorate of soda is in good call, and the hyposulphites of soda are steady. Bichromate of soda is still not available in sufficient quantities to meet the demand and this also applies to yellow Prussiate of soda. The potash chemicals are firm throughout the range and, generally speaking, are in short supply. Acid phosphate of potash is a strong market and a good demand is reported, and there is also a steady inquiry for supplies of bichromate of potash and yellow prussiate of potash. In other directions, bleaching powder is in good call and formaldehyde is a brisk market. There is a ready outlet for supplies of glycerine and peroxide of hydrogen, while a good inquiry is reported for sulphur and white powdered arsenic. Conditions in the market for coal-tar products remains rather quiet, with suppliers awaiting the return of normal overseas trading conditions.

MANCHESTER.—Industrial holiday influences in Lancashire and other factors tend to limit the volume of new business that is available on the Manchester chemical market but, on the whole, traders state that there is not much to complain of regarding the rate at which delivery specifications against existing contracts are circulating. The next week or two, with the end of the holiday season, is expected to witness some expansion of inquiry. In the meantime, deliveries of the leading soda and potash products are on a fair scale and there is also a fair movement of a wide range of miscellaneous compounds. Most sections of the fertiliser trade are still seasonally quiet.

GLASGOW.—In the Scottish heavy chemical trade during the past week there has been no change in the home market, business maintaining its steady day-to-day transactions. Prices remain firm. Export business remains unchanged.

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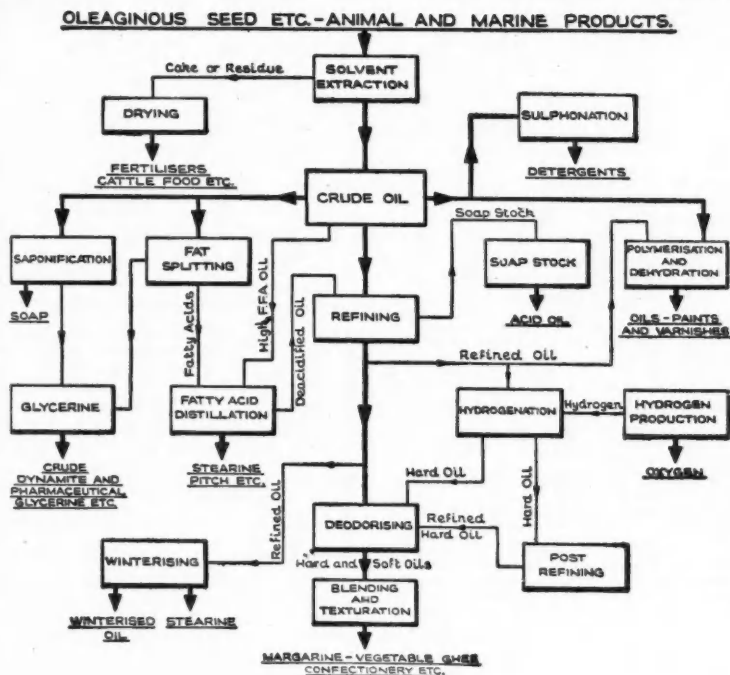
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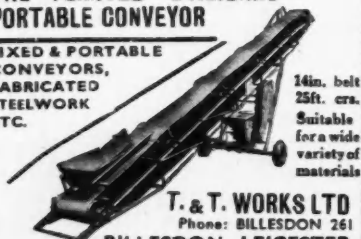
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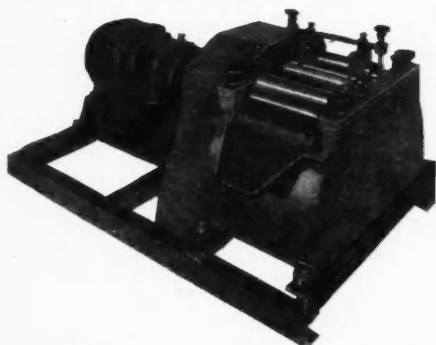
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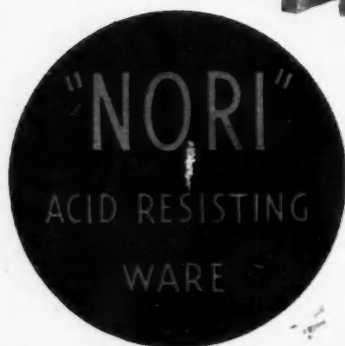
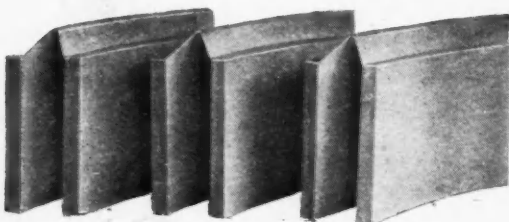
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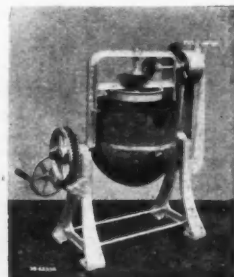


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